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Why and How to prevent Vitamin A Deficiency in times of crisis

With the prevalence of Vitamin A Deficiency (VAD) increasing as a result of reduced micronutrient-rich food intake, Vitamin A supplementation has become even more important to protect vulnerable groups against infections and diseases resulting from reduced immuno-competence.

Communicable diseases, such as measles, diarrhea, and acute respiratory infections (ARI) are some of the threats to the health and survival of individuals, especially children and women, among the poorer segments of the population (as the GOI/HKI NSS has shown), particularly those living in urban slums and other such overcrowded conditions, such as in refugee camps.

These diseases spread best in situations of overcrowding, where sanitary conditions are inadequate and access to food is limited. These circumstances are given a) among the poor and, in particular, among those individuals who live in urban slums, b) in camps for refugees or displaced people who had to flee their homes due to natural catastrophes (i.e. floods or droughts) or political unrest. In both situations, access to adequate food proves difficult, either due to lack of financial means, non-availability of food or other impairing factors.

In the case of refugees and/or displaced people, additional circumstances need to be considered. Refugees and displaced people are prone to be highly susceptible to infection and diseases as their health and nutritional status are most often far from satisfactory.

There are a number of reasons for this: a) Displaced people often belong to the poor segments of a population and have mostly consumed, in the Indonesian context for example, an unsatisfactory diet due to limited/ reduced purchasing power (impact of economic crisis); b) therefore, on arriving at camps or shelters, they are already deprived and have little bodily stores left (i.e. the time to reach new shelter can take days or weeks) and; c) their coping mechanism is diminished and any hazardous effect in terms of unsanitory conditions, imbalanced diets, etc., will lead to a higher susceptibility to illness, particularly in the manifestation of micronutrient deficiencies (VAD, Iron Deficiency Anemia, and others).

Some micronutrients, such as Vitamin A, play an important role for the maintenance of the immune system. A lack of an appropriate diet containing these much-needed micronutrients will ultimately lead to reduced immuno-competence. This is when the 'vicious cycle' begins between reduced immuno-competence (due to the lack of micronutrients) and higher susceptibility to communicable diseases (due to reduced immuno-competence, lack of micronutrients and adequate food supply and intake). Ultimately, deaths will occur and children, due to their vulnerability, will be the first to die.

Vitamin A and its relationship to childhood mortality and morbidity has been clearly recognized over the past years and some of the pioneering research has been conducted in Indonesia by a consultant working for HKI together with the Government of Indonesia (see footnote 1 in box, *History of GOI/HKI collaboration*, p2, col. 1).

However, the implications of VAD vary according to the group at risk. In pre-school children and pregnant women, VAD can lead to increased risk of mortality and morbidity.

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History of GOI/HKI collaboration

In 1915, McCollum called the factor that was essential for the survival of animals 'fat soluble A'. By 1920, it was known that a lack of vitamin A caused growth retardation, xerophthalmia and a reduced resistance to infection. The VAD problem disappeared from Europe once butter and margarine fortified with vitamin A were consumed. In developing countries, the full magnitude of the problem only became known in the 1960s-70s.

The first international meeting on VAD, held in Hyderabad, India, in 1972 was attended by an Indonesian delegation consisting of Dr Darwin Karyadi, Dr Katari N, Dalip Singh and Dr Slamet Santosa Soegianto. That same year, HKI's (then known as the American Foundation for the Overseas Blind) services were augmented with a new component, the prevention of blindness, of which the first focus was xerophthalmia. The first country to work on this was Indonesia.

The Government of Indonesia (GOI) developed a prevention program to which HKI provided technical assistance and personnel for evaluation. Based on the so-called Nutritional Blindness Prevention Project, coordinated by Dr. Ignatius Tarwotjo of the Indonesian Government and Dr. Alfred Sommer of the Johns Hopkins University (JHU) in the US,

- efforts to introduce VA capsule distribution nationwide were increased;
- the prevalence and consequences of VAD became better known;
- and the Aceh (North Sumatra) study, which was the first to detect a mortality reduction (by 34%) by distributing high-dose VA capsules[i], was initiated.

Since this historical undertaking and over the next 20 years, HKI has been involved in

- the development of social marketing approaches for the distribution of high-dose VA capsules,
- scaling up to a national VA-capsule distribution program,
- MSG-fortification trials[ii,iii],
- supporting the development of nutrition laboratory facilities,
- improving the micronutrient status of female adolescents through schools,
- and the social marketing of vitamin A-rich foods.

HKI's work in Indonesia has been supported by the US Agency for International Development (USAID), Opportunities for Micronutrient Interventions (OMNI), the Micronutrient Initiative (MI), the United Nations Children's Fund (UNICEF), and private donors.

[i] Sommer A, Tarwotjo I, Djunaedi E et al. *Impact of vitamin A supplementation on childhood mortality: a randomised controlled community trial.* Lancet 1986; 8491: 1169-1173.

[ii] Muhilal, Permaesih D, Idjradinata R, Muherdiyantiningsih, Karyadi D. *Vitamin A-fortified monosodium glutamate and health, growth and survival of children: a controlled field trial.* Am J Clin Nutr 1988; 48: 1271-1276.

[iii] Muhilal, Murdiana A, Azis I, Saidin S, Jahari AB, Karyadi D. *Vitamin A-fortified monosodium glutamate and vitamin A status: a controled field trial*. Am J Clin Nutr 1988; 48: 1265-1270.

Benefits of improved Vitamin A Status[1]

- **The survival chances of children aged 6 months to 6 years are dramatically increased by improving Vitamin A status, as their risk of mortality from measles is reduced by about 50%, from diarrhea by about 40%, and overall mortality by 25-35%.**
- **Improved Vitamin A status among deficient children reduces the severity of infectious illnesses, particularly measles and chronic diarrhea, and is associated with a reduced rate of hospital admissions and reduced need for out-patient services, therefore lowering the overall cost of health services.**

[1] Source: *Vitamin A Global Initiative – A Strategy for Acceleration of Progress in Combating Vitamin A Deficiency.* (Consensus of an Informal Technical Consultation convened by UNICEF/MI/ WHO/CIDA/USAID)

(Continued from p1)

Supplementation with Vitamin A has shown a 35% reduction in childhood mortality (Asia), and 40-50% reduction in maternal mortality.

It is obvious that immediate action to provide Vitamin A is needed and highly recommended. In the case of measles, i.e. it has been shown that the improvement of Vitamin A status in deficienct children leads to a 50% reduction of measles-related mortality, morbidity and blindness.

The current situation in Indonesia requires a close monitoring of possible VAD and other micronutrient deficiency outbreaks as well as close monitoring of increased micronutrient needs due to more frequent cases of infectious diseases.

On the next page is a summary that presents the latest guidelines issued by the WHO/UNICEF/IVACG Task Force for the case management of VAD. In situations of crisis, Table 2 is of particular importance, as it describes the case-management for children at high risk, who are actually children with a history of chronically inadequate food intake, poor health and acute diseases, i.e. diarrhea, measles, severe malnutrition, and others.

GENERAL REFERENCES:

1. Bloem MW, S Farooq, A. Kuttab. *Vitamin A deficiency and malnutrition in southern Iraq: rapid assessment report, 14-26 May 1991*. Helen Keller International/Save the Children/UNICEF.
2. Wijnroks M, Bloem MW, Islam N, Rahman H, Das SK, Hye A, Hall G. *Surveillance of the Health and Nutritional Status of Rohingya Refugees in Bangladesh*. Disasters 17(4):348-56, 1993.
3. Berry-Koch A, Moench R, Hakewill P, Dualeh M. *Alleviation of nutritional deficiency diseases in refugees*. Food and Nutrition Bulletin 12(2):106-12, 1990.
4. Marion Kelly. *Infant Feeding in Emergencies*. Disasters, 17(2):110-21, 1993.

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Universal distribution. (Table 1) Periodic distribution for prevention of VAD to:

- All preschool-age children, especially children 6 months to 5 years of age and children in high-risk regions
- All mothers in high-risk regions within 8 weeks of delivery (In the Indonesian context, within 30 days of delivery)
- High-risk groups, such as refugees

The timing of the distribution depends on the dosage, season, logistic constraints and available resources. The mode of distribution should make Vitamin A available before a season of special risk.

Targeted distribution to high-risk children. (Table 2) Distribution targeted at:

- Infants and children with measles, diarrhea, respiratory disease, chickenpox, other severe infections, or severe protein energy malnutrition
- Infants and children living in the vicinity of children with clinical VAD

Vitamin A supplementation in targeted distribution helps to re-establish bodily reserves depleted by chronic illness, protecting against VAD as well as the severity of infections. Measles morbidity and mortality is also reduced.

A child who has received a high-dose supplement within the last 30 days should not receive an additional targeted dose.

Targeted distribution to pregnant women. Pregnant women have an increased risk of VAD, especially in populations where VAD is endemic. A significant number of pregnant women develop night blindness, which is a sign of mild VAD. A daily dose of 10,000 IU or a weekly dose of 25,000 IU can be provided to improve the Vitamin A status of mother and fetus. If severe signs of active xerophthalmia occur, the treatment schedule in Table 3 can be administered, weighing the possible teratogenic effect or other risks of a high dose of Vitamin A to the fetus against the consequences of VAD on the woman and her fetus.

Treatment of xerophthalmia. (Table 3) Xerophthalmia is a clinical manifestation of severe VAD and occurs in several stages: night blindness, conjunctival xerosis with Bitot's spots, corneal xerosis, corneal ulceration, and keratomalacia. Oral doses of Vitamin A should be administered immediately upon diagnosis of xerophthalmia. The treatment schedule in Table 3 applies to individuals of all ages, except women of reproductive age. Women of reproductive age with night blindness or Bitot's spots should be treated with a daily oral dose of 5,000-10,000 IU (not exceeding 10,000 IU; may be substituted with a weekly dose of 25,000 IU) of Vitamin A for at least four weeks.

Treatment of children during measles. The treatment schedule in Table 3 is also recommended as the optimal therapy to treat children during episodes of measles. Children suffering from VAD and measles at the same time are at risk of serious and potentially fatal complications, hence immediate treatment with Vitamin A supplementation – which has been shown to reduce the risk of excessive measles case-fatality – should be provided upon diagnosis.

Sources: *Vitamin A supplements*. Prepared by a WHO/UNICEF/IVACG Task Force. World Health Organization, Geneva, 1997.
Pedoman Pemberian Kapsul Vitamin A Dosis Tinggi (High-dose Vitamin A Capsule Distribution Manual). Ministry of Health, Republic of Indonesia/UNICEF/HKI, 1993.

Table 1. High-dose universal-distribution schedule for prevention of VAD

Target group	Dosage
Infants < 6 months of age [a] – Non-breastfed infants – Breastfed infants whose mothers have not received supplemental vitamin A	50,000 IU orally (not yet a program in Indonesia)
Infants 6-12 months of age	100,000 IU orally, every 4-6 months [b]
Children > 12 months of age	200,000 IU orally, every 4-6 months [b]
Mothers	200,000 IU orally, within 8 weeks of delivery (within 30 days of delivery in the Indonesian context)

a. Programmes should ensure that infants < 6 months of age do not receive the larger dose intended for mothers. It may therefore be preferable to dose infants with a liquid dispenser to avoid possible confusion between capsules of different dosages.
b. Evidence suggests Vitamin A reserves in deficient individuals can fall below optimal levels 3-6 months following a high dose; however, dosing at 4-6 month intervals should be sufficient to prevent serious consequences of VAD.

Table 2. High-dose prevention schedule for children at high-risk of VAD

Target group	Dosage
Infants < 6 months of age	50,000 IU orally [a]
Infants 6-12 months of age	100,000 IU orally [a]
Children > 12 months of age	200,000 IU orally [a]

a. Those known to have received a routine high-dose Vitamin A supplement within the last 30 days should not receive an additional dose.

Table 3. Treatment schedule for xerophthalmia for all age groups except women of reproductive age

Timing	Dosage [b]
Immediately on diagnosis	
– Infants < 6 months of age	50,000 IU
– Infants 6-12 months of age	100,000 IU
– Children > 12 months of age [a]	200,000 IU
Next day	Same age-specific dose [c]
At least 2 weeks later	Same age-specific dose [d]

a. Caution: Women of reproductive age with night blindness or Bitot's spots should receive daily doses ≤ 10,000 IU, or weekly doses of 25,000 IU. However, all women of childbearing age, whether or not pregnant, who exhibit severe signs of active xerophthalmia (i.e. acute corneal lesions) should be treated as above.
b. For oral administration, preferably in an oil-based preparation.
c. The mother or other responsible person can administer the next-day dose at home.
d. To be administered at a subsequent health service contact with the individual

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